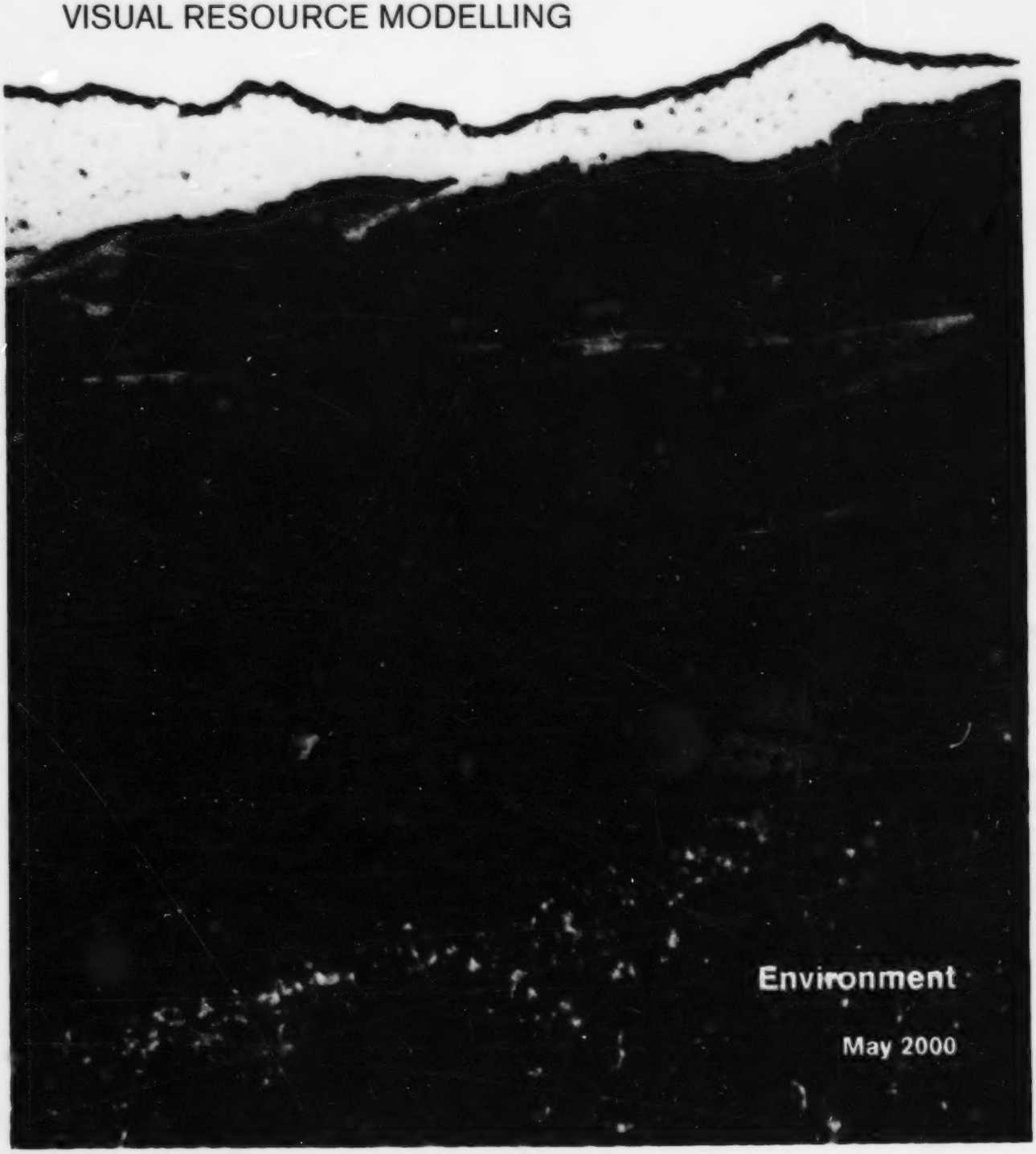
The Southern Rockies Landscape Planning Pilot Study

VISUAL RESOURCE MODELLING



Environment

May 2000

NOTE:
Every effort has been made to ensure the accuracy of the information in this report. Any opinions expressed are those of the authors and do not necessarily reflect the position of Alberta Environment.

100-07308/

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VISUAL RESOURCE MODELLING

Alberta
Environment
Land and Forest Service
Integrated Resource Management Division

OLSON
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PLANNING & DESIGN CONSULTANTS
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Landscape Architecture
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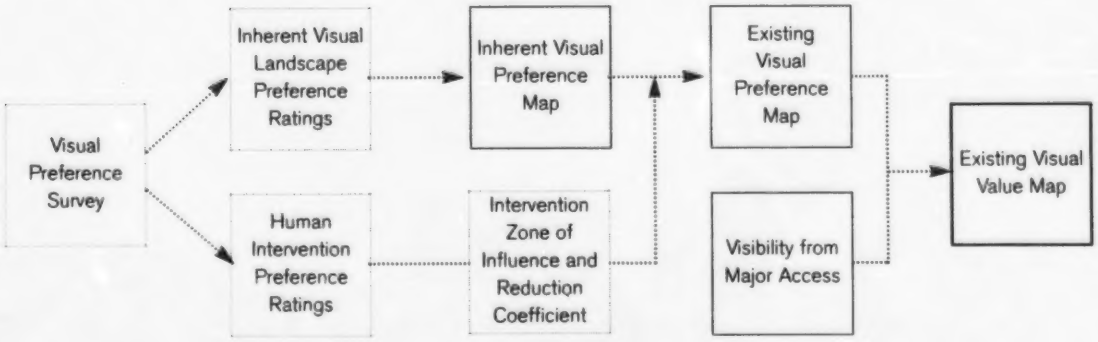
1.0 INTRODUCTION

This document reports on the visual resource modelling component of the Southern Rockies Landscape Planning Pilot Study. The project area provides significant and highly valued scenic resources that need to be planned for and managed. The primary purpose of the modelling investigations were to identify, evaluate, and map the visual resource value of the existing landscape. In doing so, a quantitative evaluation of the scenic landscape was developed to provide a mechanism for visual impact evaluation and informed decision–making.

Visual resource value, as determined in this study, represents a combination of public preference ratings for the visual landscape and the visual exposure (degree of visibility) of the landscape from transportation corridors. Landscape preference ratings were obtained from a visual preference survey and combined with computer generated visibility data. The Final Visual Resource Value map presents a range of visual resource values representing a combination of visibility and preference rating classes. Figure 1 outlines the general model structure.

Figure 1. General Visual Model Structure


Visual Preference Survey
Inherent Visual Landscape Preference Ratings
Human Intervention Preference Ratings
Inherent Visual Preference Map
Intervention Zone of Influence and Reduction Coefficient
Existing Visual Preference Map
Visibility from Major Access
Existing Visual Value Map

2.0 VISUAL PREFERENCE SURVEY

A visual preference survey was conducted to identify public perceptions towards the visual quality of the landscape. The survey was aimed at providing quantitative data that could be mapped and analyzed. Landscape preference ratings were obtained for both the inherent visual landscape (free of visually obvious human interventions) as well as existing landscapes influenced by various human interventions and management activities. Results from the survey were used to produce an Inherent Visual Preference Class map, Human Intervention Zone of Influence map and an Existing Visual Preference Class map (the inherent preference rating modified by human interventions).

2.1 Visual Preference Survey Methods and Results

Photographic representation was selected as the best means of obtaining preference data due to the scale of the study area, diverse user population and range of landscape representations. Studies have shown that photographs provide a reasonable representation of public preference and are an acceptable surrogate for the actual physical setting (Hull, 192; Kellomaki, 1984; Stewart, 1984).

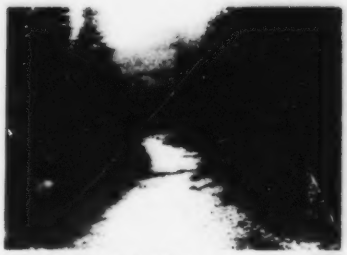
The visual preference survey was conducted using a slide presentation of 93 colour photographs representing a range of unaltered landscapes and human interventions. A total of 89 respondents were surveyed in Calgary, Lethbridge, Crowsnest Pass and Chain Lakes, as well as Alberta Environment staff in Edmonton. Participants were asked to independently rate each photograph on a 5–point scale ranging from 1 (very low visual preference) to 5 (very high visual preference).

2.1.1 Inherent Visual Landscape Representation

The inherent visual landscape represents lands that are relatively free of human interventions and activities (i.e., mining, forestry, utilities, etc.). The "land system" classification identified in the Ecological Land Classification (ELC) data for the Livingstone–Porcupine Hills region of Alberta was used to identify inherent landscape types (Strong, 1979). A "land system" is the third level of discrimination that is mapped at a scale of 1:100,000 and is identified by recurring patterns of slope, landform, soils, and vegetation.

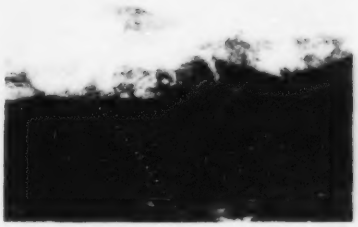
A set of 43 photographs was selected to represent the 76 land systems found in the study area (several photographs contained more than one land system in proximity).

A mean preference rating was calculated for each of the 43 inherent landscape photographs to establish preference ratings for the various land systems. The Inherent Visual Preference Class map represents the mean ratings categorized. In general, the results indicate three clusters of landscape systems in the preference ratings. Top ranking land systems have prominent mountain views with forested slopes or the presence of water. Middle range preference ratings corresponded to land systems with a mix of grassland, aspen, and conifer slopes, whereas the lowest ratings were dominated by grassland systems. It is important to note that the vast majority of the land systems were rated as 3 and higher, implying that the region as a whole is highly preferred visually.



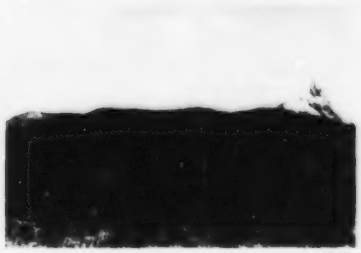
Land System(s): 6F1 (55)

Mean Preference Rating: 4.75
Preference Class: 4



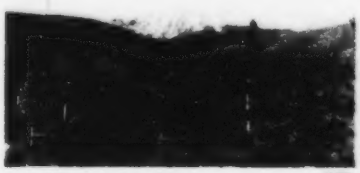
Land System(s): 7C1, 7CX1, 7R1 7XR1, 7XR2 (13)

Mean Preference Rating: 4.72
Preference Class: 4



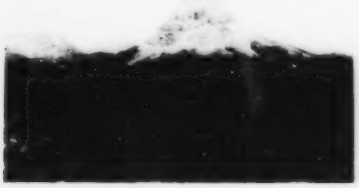
Land System(s): 6C1, 6C2, 6C3 (53)

Mean Preference Rating: 4.51
Preference Class: 4



Land System(s): 6M1 (57)

Mean Preference Rating: 4.42
Preference Class: 4

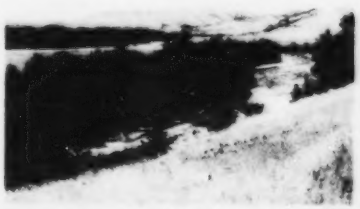


Land System(s): 6X4, 6X5 (71)

Mean Preference Rating: 4.40
Preference Class: 4

Land System(s): 6M3 (7)

Mean Preference Rating: 4.26
Preference Class: 4



Land System(s): 3F1, 4F2 (28)

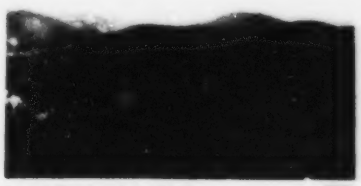
Mean Preference Rating: 4.26
Preference Class: 4

Land System(s): 4M1, 4M2 (26)

Mean Preference Rating: 4.25
Preference Class: 4

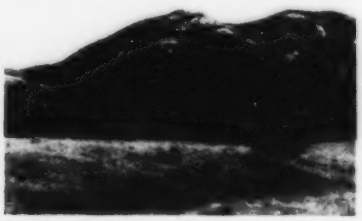
Land System(s): 4F1, 4M3 (32)

Mean Preference Rating: 4.16
Preference Class: 4



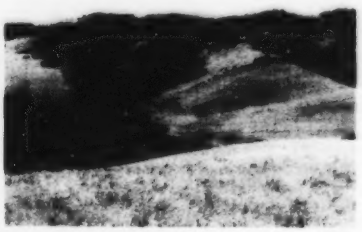
Land System(s): 6X2 (64)

Mean Preference Rating: 4.07
Preference Class: 4



Land System(s): 6X1 (11)

Mean Preference Rating: 4.00
Preference Class: 4



Land System(s): 5MR2 (24)

Mean Preference Rating: 3.93
Preference Class: 3

Land System(s): 5M2, 5M3, 5X2 (15)

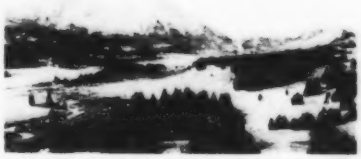
Mean Preference Rating: 3.92
Preference Class: 3

Land System(s): 3M2 (2)

Mean Preference Rating: 3.90
Preference Class: 3

Land System(s): 6X3 (31)

Mean Preference Rating: 3.75
Preference Class: 3

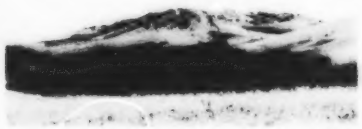


Land System(s): 5G1, 5G2, 5F1 5F2 (46)

Mean Preference Rating: 3.72
Preference Class: 3

Land System(s): 4MR3 (14)

Mean Preference Rating: 3.72
Preference Class: 3



Land System(s): 5MR1 (17)

Mean Preference Rating: 3.64
Preference Class: 3

Land System(s): 3L1 (93)

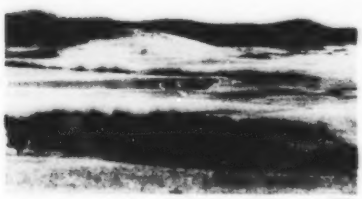
Mean Preference Rating: 3.62
Preference Class: 3

Land System(s): 6RC1, 6RX1 (60)

Mean Preference Rating: 3.57
Preference Class: 3

Land System(s): 5M4, 5M5, 5X3 (16)

Mean Preference Rating: 3.55
Preference Class: 3

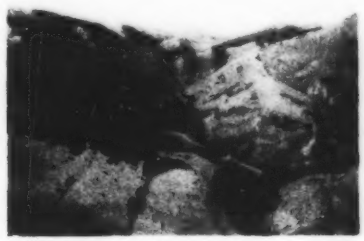


Land System(s): 3M3, 3M5, 3M6 (23)

Mean Preference Rating: 3.51
Preference Class: 3

Land System(s): 5M1 (37)

Mean Preference Rating: 3.46
Preference Class: 3

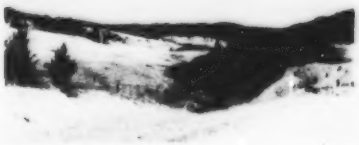


Land System(s): 6XC1 (85)

Mean Preference Rating: 3.44
Preference Class: 3

Land System(s): 5MR3 (42)

Mean Preference Rating: 3.38
Preference Class: 3



Land System(s): 3M1 (5)

Mean Preference Rating: 3.37
Preference Class: 3

Land System(s): 4MR1, 5G1, 5G3 (69)

Mean Preference Rating: 3.33
Preference Class: 3

Land System(s): 4M2 (40)

Mean Preference Rating: 3.33
Preference Class: 3

Land System(s): 5MR3 (52)

Mean Preference Rating: 3.31
Preference Class: 3

Land System(s): 4MR1 (67)

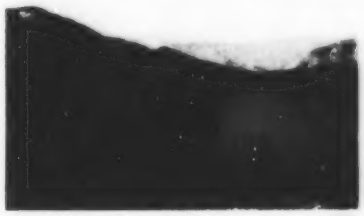
Mean Preference Rating: 3.27
Preference Class: 3

Land System(s): 4M4 (19)

Mean Preference Rating: 3.19
Preference Class: 3

Land System(s): 4L1, 4L2, 4L3 (92)

Mean Preference Rating: 3.19
Preference Class: 3

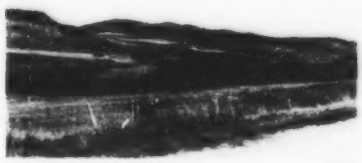


Land System(s): 6M2 (27)

Mean Preference Rating: 3.15
Preference Class: 3

Land System(s): 3G1, 3G2, 3G4, 4G1, 4G2, 4G3 (30)

Mean Preference Rating: 3.10
Preference Class: 3



Land System(s): 4MR2 (12)

Mean Preference Rating: 3.07
Preference Class: 3

Land System(s): 5XR1 (18)

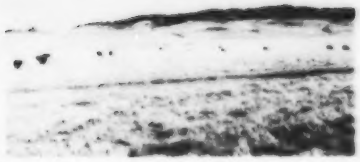
Mean Preference Rating: 3.03
Preference Class: 3

Land System(s): 6G1, 6G2 (56)

Mean Preference Rating: 3.01
Preference Class: 3

Land System(s): 3M4 (25)

Mean Preference Rating: 2.98
Preference Class: 2

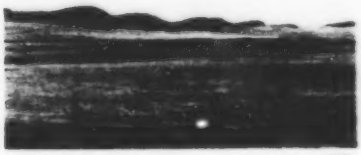


Land System(s): 3L2, 3M7 (77)

Mean Preference Rating: 2.97
Preference Class: 2

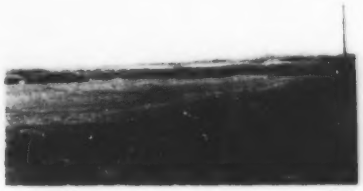
Land System(s): 5X1 (51)

Mean Preference Rating: 2.88
Preference Class: 2



Land System(s): 3L1 (75)

Mean Preference Rating: 2.88
Preference Class: 2



Land System(s): 3L2, 3M7 (91)

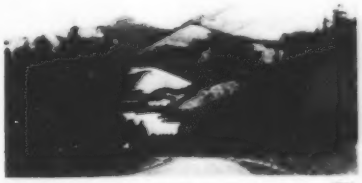
Mean Preference Rating: 2.88
Preference Class: 2

Land System(s): 6X1 (63)

Mean Preference Rating: 2.85
Preference Class: 2

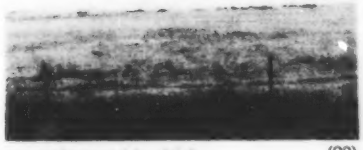
Land System(s): 3G5 (61)

Mean Preference Rating: 2.84
Preference Class: 2



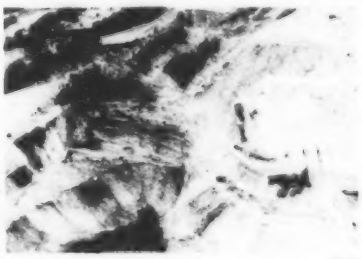
Land System(s): 6X6, 6X7 (72)

Mean Preference Rating: 2.47
Preference Class: 2



Land System(s): 3G3 (20)

Mean Preference Rating: 2.18
Preference Class: 2



Land System(s): 6D1 (54)

Mean Preference Rating: 1.79
Preference Class: 1

Note: Land system 6D1 is identified in the ELC as being "created as overburden from strip mining" (Strong, 1979). It is the only landscape feature that "has been drastically modified by man" that receives its own classification.

2.1.2 Human Intervention Representation

The influence of human interventions and landscape management practices on visual preference ratings were surveyed using a set of 50 photographs. Timber harvest, gas wells, transmission lines, camping, and rural settlements were identified as the main interventions found within the study area. In order to measure the influence of the intervention on visual preference, photographs were computer manipulated to simulate the "before or after" condition of the landscape. Before and after pairs were flipped horizontally and randomly distributed throughout the survey set (all paired photographs included within this document have been flipped back to their original state for clarity and ease of comparison).

In addition to measuring influences on the presence and absence of human interventions, timber harvest practices were added to the survey set in order to obtain preference ratings on harvest cut pattern types (i.e., curvilinear versus rectilinear) and post harvest management of the cutblock (i.e., brush piles – disposal).

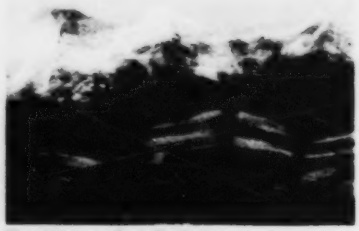
Example:

Well site (after intervention)

Well site removed (before intervention)

Existing Landscape

Curvilinear Cut Pattern



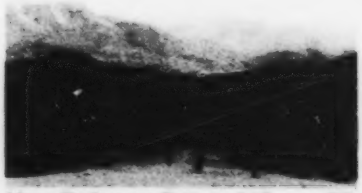
Rectilinear Cut Pattern

The following sets of photographs are organized to illustrate the findings from measuring preference ratings for the presence and absence of human interventions, and the ratings of different landscape management practices. Mean preference ratings and the percent preference rating reduction between photographs was measured.

Mean Preference Rating: 4.51 (53)

Mean Preference Rating: 3.02 (22)

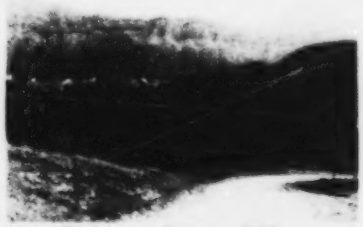
Preference Rating Reduction = 33%



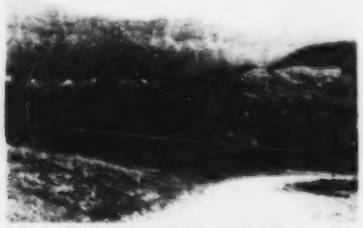
Mean Preference Rating: 4.15 (50)

Mean Preference Rating: 3.09 (90)

Preference Rating Reduction = 26%

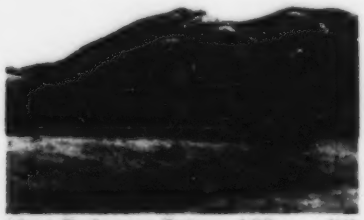


Mean Preference Rating: 3.53 (4)

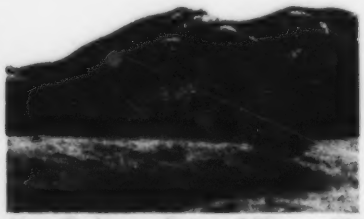


Mean Preference Rating: 2.42 (81)

Preference Rating Reduction = 31%

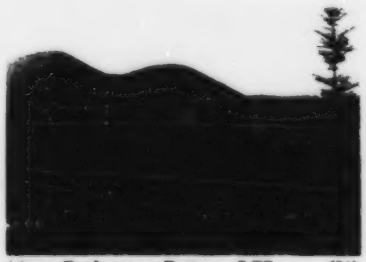


Mean Preference Rating: 4.00 (11)

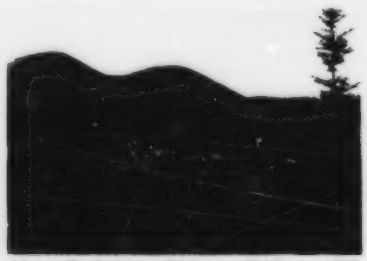


Mean Preference Rating: 2.76 (62)

Preference Rating Reduction = 31%



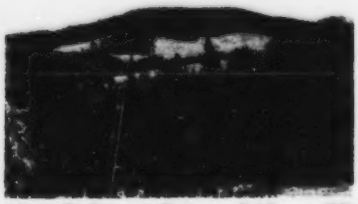
Mean Preference Rating: 3.75 (31)



Mean Preference Rating: 2.49 (70)

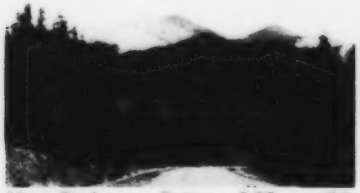
Preference Rating Reduction = 34%

Mean Preference Rating: 3.85 (3)

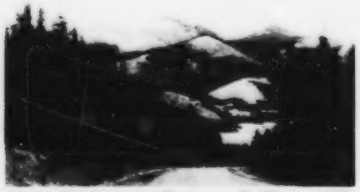


Mean Preference Rating: 3.13 (80)

Preference Rating Reduction = 19%



Mean Preference Rating: 3.62 (34)



Mean Preference Rating: 2.47 (72)

Photograph #34 is a computer manipulation of photograph #72 which represents the natural landscape (no harvest has been done).

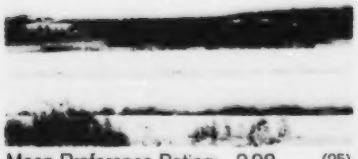
Preference Rating Reduction = 32%

Mean Preference Rating: 3.15 (27)

Mean Preference Rating: 3.46 (58)

Photograph #58 represents the existing condition in which a very large area (approximately 900 hectares) was cut in a curvilinear pattern. In this instance, the cut area was slightly preferred over the forested slope.

Preference Rating Increase = 9%



Mean Preference Rating: 2.98 (25)

Mean Preference Rating: 2.57 (6)

Photographs 6, 83, and 65 indicate that the closer a well site is to a road, the greater its influence is on reducing the visual preference rating.

Preference Rating Reduction = 14%

Mean Preference Rating: 2.82 (45)

Mean Preference Rating: 2.08 (83)

Preference Rating Reduction = 26%

Mean Preference Rating: 3.11 (47)

Mean Preference Rating: 1.81 (65)

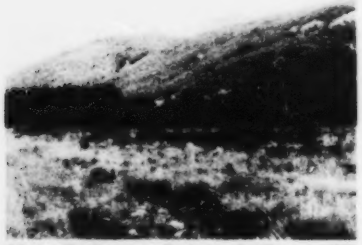
Preference Rating Reduction = 42%

Mean Preference Rating: 3.60 (89)

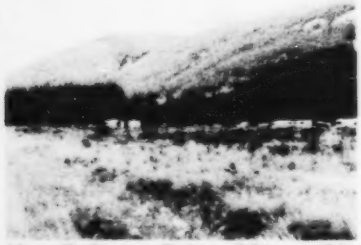
Mean Preference Rating: 2.49 (49)

Transmission lines have greatly reduced the visual preference rating for this landscape.

Preference Rating Reduction = 31%



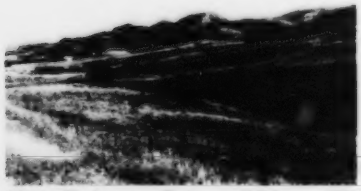
Mean Preference Rating: 3.17 (48)



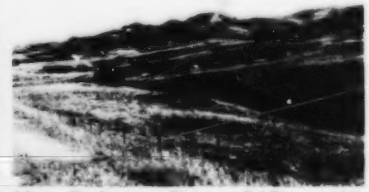
Mean Preference Rating: 2.31 (88)

The view of a random camping area and recreational vehicles reduced the visual preference of the landscape.

Preference Rating Reduction = 27%



Mean Preference Rating: 3.34 (82)



Mean Preference Rating: 3.10 (44)

Highly dispersed single family rural settlements had little to no impact on visual preference ratings. (Higher density settlement patterns were not sampled).

Preference Rating Reduction = 7%

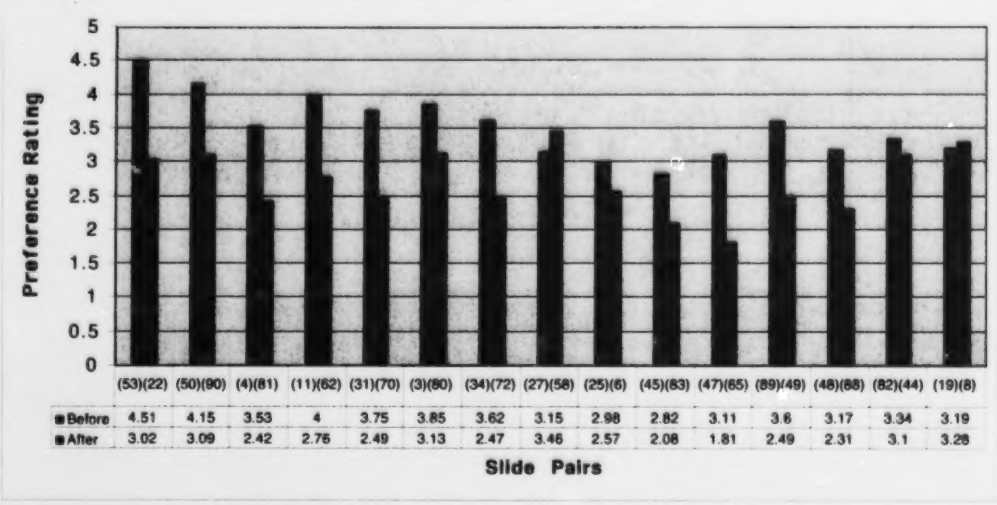
Mean Preference Rating: 3.19 (19)

Mean Preference Rating: 3.28 (8)

Preference Rating Reduction = 3%

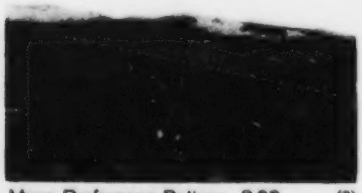
The percent reduction in preference rating between the before and after conditions was measured for each photograph set (the greater the difference in preference rating, the higher the preference rating reduction). The findings indicated that preference ratings decreased with the presence of timber harvest, wells, camping, and transmission lines. Rural settlements in the form of individual farmsteads did not have significant affects on visual preference ratings. In general, the survey results indicate a preference rating reduction of approximately 30% for landscapes with obvious human interventions. The results of each type of intervention and the percent reduction are summarized in Figure 2 below.

Figure 2. Preference Ratings for Photograph Pairs



The photograph pairs below measured visual preference towards types of post harvest practices. The findings indicate that the removal of slash piles and cut lines resulted in a higher preference rating. Random and more curvilinear cut patterns with islands of vegetation also were rated higher.

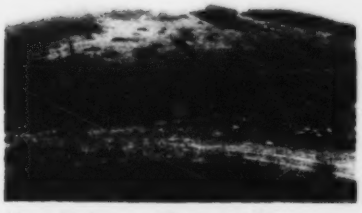
Mean Preference Rating: 1.43 (43)



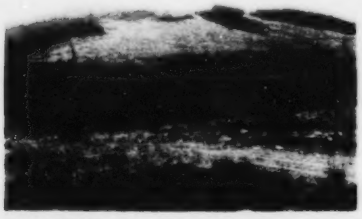
Mean Preference Rating: 2.09 (9)

A random, more curvilinear cut pattern with islands of vegetation received a slightly higher visual preference rating than the rectilinear cut pattern. Slash piles have been removed.

Preference Rating Increase = 32%



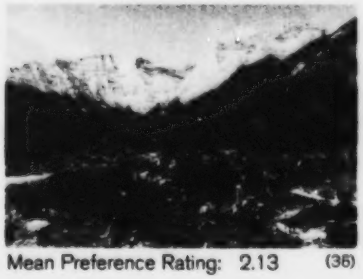
Mean Preference Rating: 1.63 (41)



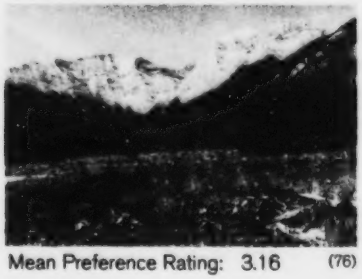
Mean Preference Rating: 1.84 (68)

A cutblock with slash piles removed received a slightly higher preference rating than one with piles scattered throughout.

Preference Rating Increase = 11%



Mean Preference Rating: 2.13 (36)



Mean Preference Rating: 3.16 (76)

The elimination of slash piles and logging debris in the foreground of this photograph resulted in a much higher visual preference rating.

Preference Rating Increase = 33%

Mean Preference Rating: 2.35 (38)

Mean Preference Rating: 2.88 (78)

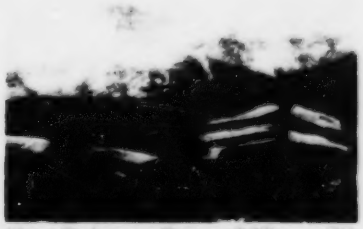
The removal of the straight cut line and the slight alteration in cut pattern resulted in a higher visual preference rating.

Preference Rating Increase = 18%

The following photograph sets display visual preference ratings for various types of timber harvest patterns. In all cases, landscape photographs without timber harvest rated the highest. In the first three sets of photographs, curvilinear or random cut patterns received a higher preference rating than the rectilinear cut pattern. (refer to Figure 3).

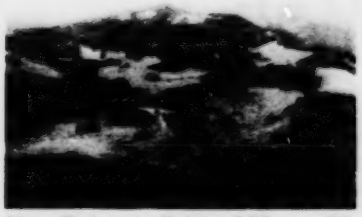
Mean Preference Rating: 4.72 (13)

Mean Preference Rating: 3.18 (73)

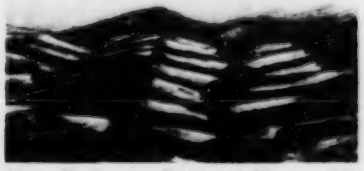


Mean Preference Rating: 2.26 (21)

Mean Preference Rating: 4.07 (64)

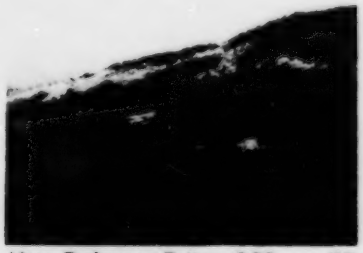


Mean Preference Rating: 2.62 (66)



Mean Preference Rating: 1.63 (29)

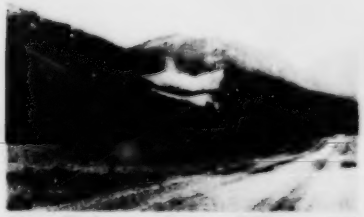
Mean Preference Rating: 4.42 (57)



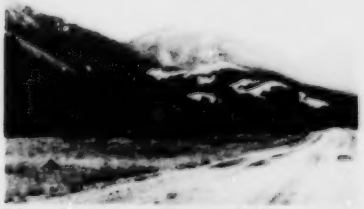
Mean Preference Rating: 3.30 (33)

Mean Preference Rating: 3.00 (1)

Mean Preference Rating: 3.36 (79)

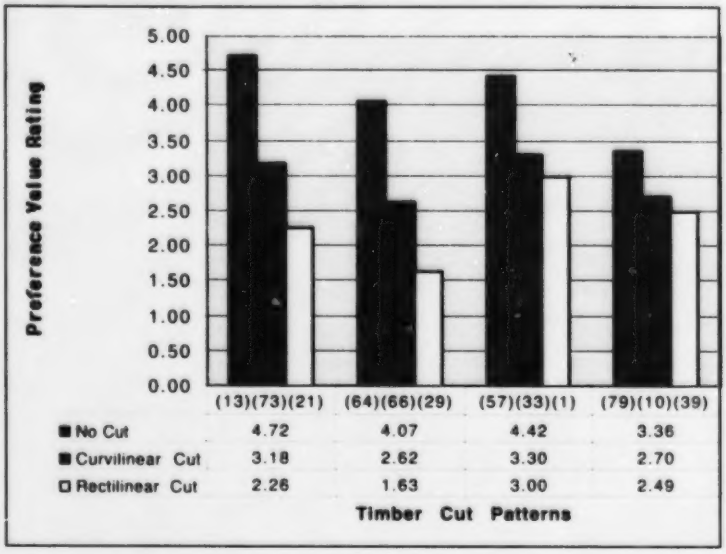


Mean Preference Rating: 2.70 (10)



Mean Preference Rating: 2.49 (39)

Figure 3. Preference Ratings for Types of Harvest Patterns



The survey also included a photograph of a forest following wildfire, a logging operation staging area, and a heavily grazed pasture. However, comparison slides were not included in order to measure preference rating responses and therefore, are not included in the analysis set. In addition, urban areas and higher density rural settlements (i.e., one farmhouse per quarter section as currently allowed under legislation) were not sampled. Future visual resource studies should include comparisons of such interventions.

Regeneration following wildfire

Mean Preference Rating: 3.31 (87)

Grazing

Mean Preference Rating: 2.43 (84)

Logging Site

Mean Preference Rating: 1.57 (86)

3.0 VISUAL RESOURCE MAPPING

Landscape visual preference, visibility, and visual resource value are the main products of visual resource mapping. Each map displays visual resource information in a spatial pattern on the landscape. Input data and the development of each map is described in further detail in the following sections.

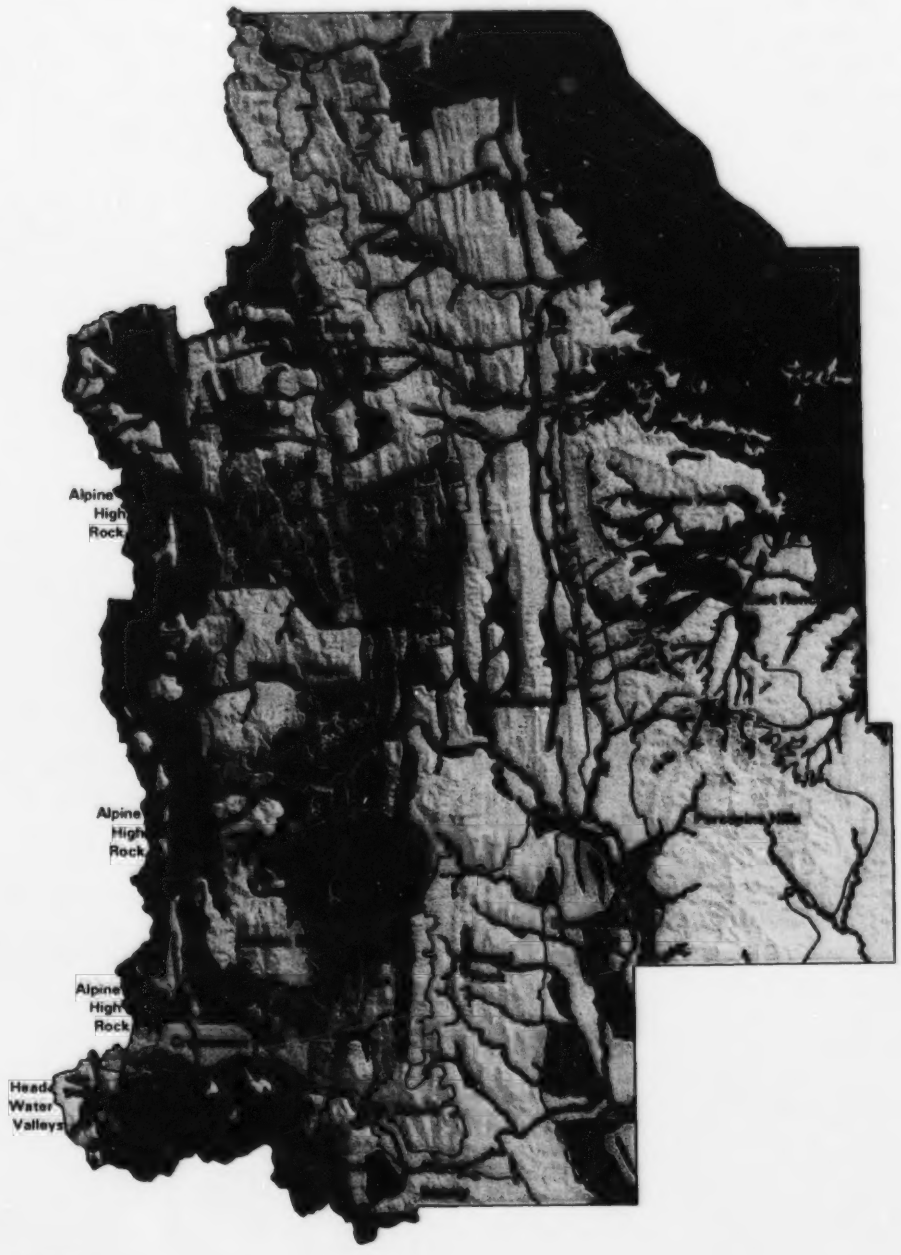
3.1 Visual Preference

3.1.1 Inherent Visual Preference

The Inherent Visual Preference Class map spatially identifies the visual preference for the various land systems *prior* to the influence of human interventions. Mean preference ratings for each Ecological Land Classification (ELC) land system were generated from the visual preference survey data.

Example: Land Systems 4M1 and 4M2 are represented in this photograph. The mean preference rating was 4.25. All 4M1 and 4M2 land systems on the ELC map were then recoded to a 4.25.

Visual preference ratings were ranked into four preference classes (i.e., 1.0–2.0, 2.1–3.0, 3.1–4.0, and 4.1–5.0) to produce an aggregate preference rating map titled Inherent Visual Preference Classes. Preference class (1) corresponds to the lowest visual preference ratings and preference class (4) to the highest visual preference ratings.

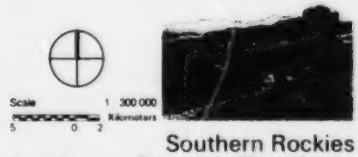


Legend

	Area(ha)
Least Preferred	230
Less Preferred	50,257
More Preferred	269,889
Most Preferred	185,329

Landscape Management Unit Boundary

INHERENT VISUAL PREFERENCE CLASSES



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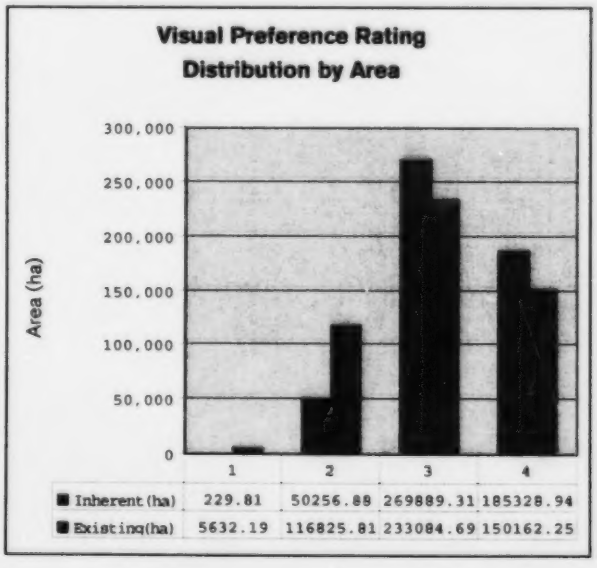
3.1.2 Existing Visual Preference

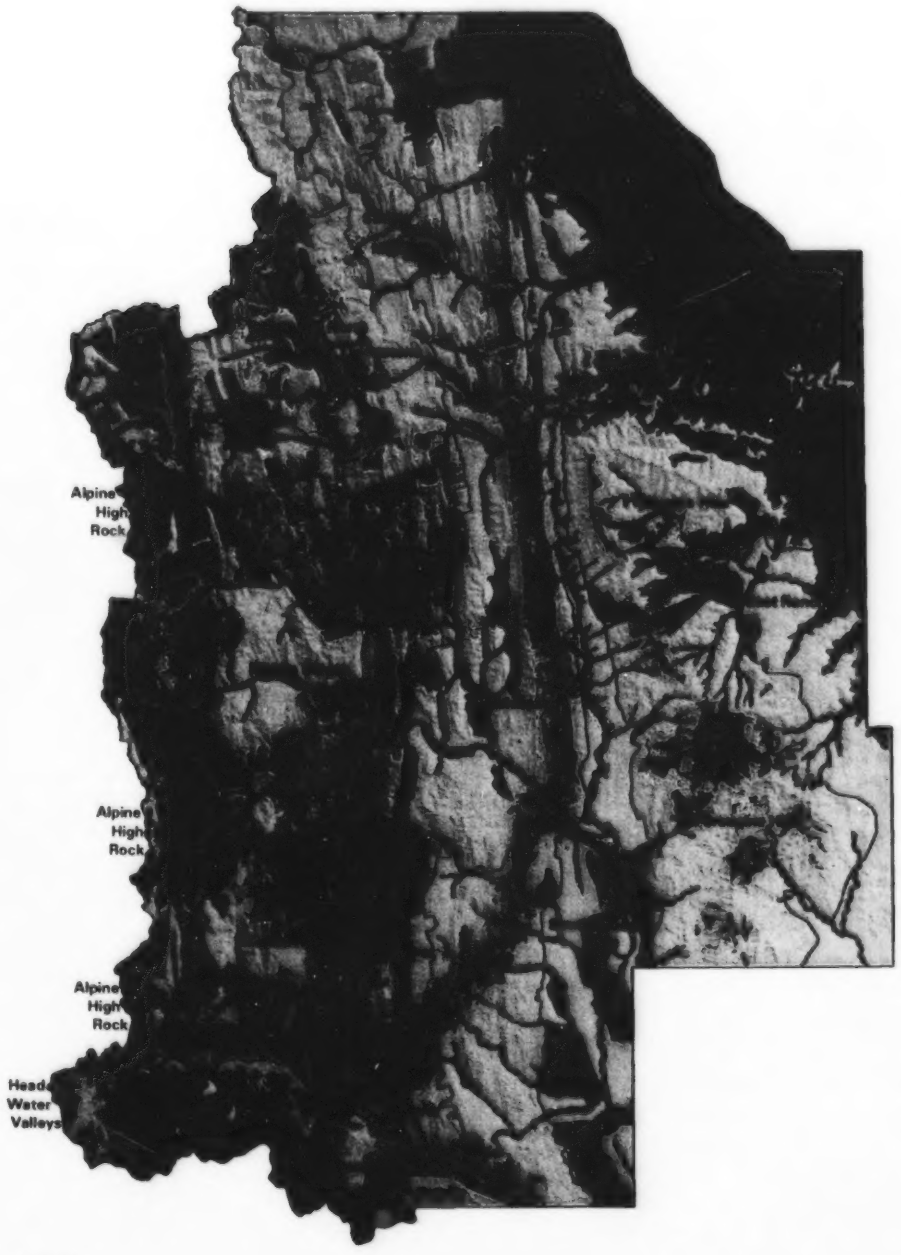
Existing visual preference is based upon the survey findings that human interventions modify the visual preference of the inherent landscape. The Existing Visual Preference Class map is the result of adjusting the Inherent Visual Preference ratings assigned to each land system based upon the presence of human interventions.

All known human intervention sites for gas wells, cutblocks, overhead transmission lines and campgrounds were identified (rural settlements were not included due to little change in preference ratings between presence and absence of settlements). An influence zone of 1 kilometer was radiated from each intervention to determine areas from which the interventions are visible. The digital elevation model was incorporated in this process in order to adjust for variations in terrain and site lines. A reduction coefficient of 0.7 (reflecting the 30% reduction rating) was assigned to both the intervention as well as all areas within the influence zone from which the intervention could be seen. The Inherent Visual Preference Class map was combined (multiplied) with the Intervention Influence map to produce the Existing Visual Preference Class map.

The existing visual preference ratings were aggregated into four preference classes using the same range as the Inherent Visual Preference Class map (i.e., 1 = lowest preference rating and 4 = highest preference rating). A comparison of the two maps reflects the decrease in visual preference rating of the existing landscape due to human interventions. The visual quality of approximately 72,000 hectares of land was reduced to a preference rating of 1 or 2 from an inherent value rating of 3 or 4 (refer to Figure 4). The overhead transmission line and large cutblock areas had the greatest amount of land area influenced by their presence. In particular, the overhead transmission line transects the study area from north to south creating a broad swath of influence.

Figure 4. Visual Preference Rating Distribution – Inherent vs Existing





Legend

	Area(ha)
Least Preferred	5,632
Less Preferred	116,826
More Preferred	233,085
Most Preferred	150,162

Landscape Management Unit Boundary

EXISTING VISUAL PREFERENCE CLASSES

Southern Rockies
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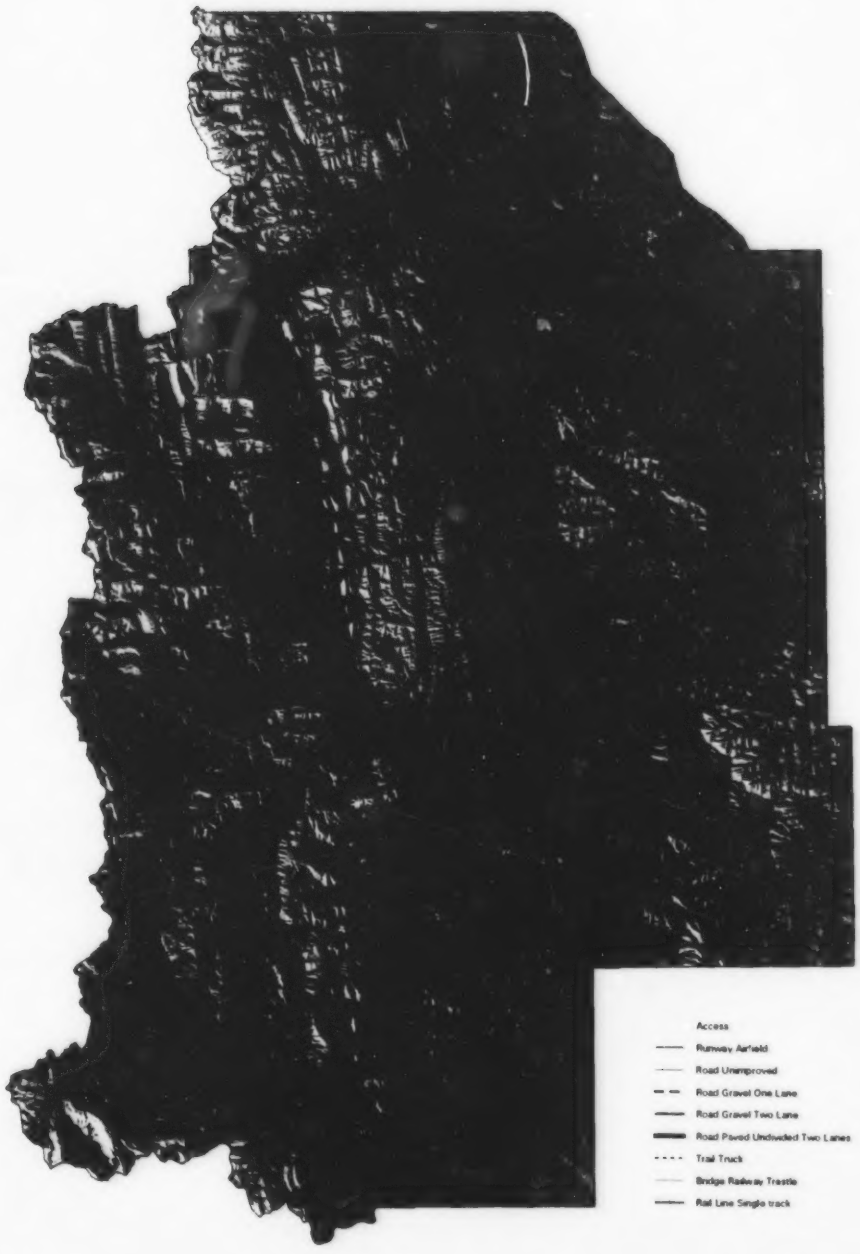
3.2 Visibility

Visibility is defined in terms of whether areas are visible from transportation corridors ranging from truck trails to major paved roads in the study area. The Visibility map was produced using a road network map as well as a digital elevation map with tree heights added to the base elevation values. A 360° radiate operation, at a maximum distance of 10 kilometers, was performed from a set of vertices on the road network (all roads indicated on the map had a set of vertices). Each time a cell was seen from a vertex, it received a count of one. Terrain and tree height influenced the radiate operation and cell count. Individual cells ranged from being seen up to 591 times to not being seen at all.

The Visibility map was classified into five categories according to the following cell count ranges: (1) Not seen*; (2) 1–5; (3) 6–16; (4) 17–44; and (5) 45–591. Variations in numerical distribution ranges compensate for a skew in the cell count range in which a high number of cells were seen a limited number of times.

* As new transportation corridors are developed or additional vertices in the road network are added, the visibility data will change. Areas currently mapped as not seen or less frequently seen may change to higher cell count ranges.

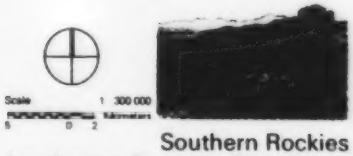
The degree to which human interventions are seen is determined by terrain, vegetation, size and location.



Legend

	Area(ha)
Not Visible	227,451
Least Visible	69,243
Less Visible	69,501
More Visible	69,739
Most Visible	70,291

EXISTING VISIBILITY CLASS



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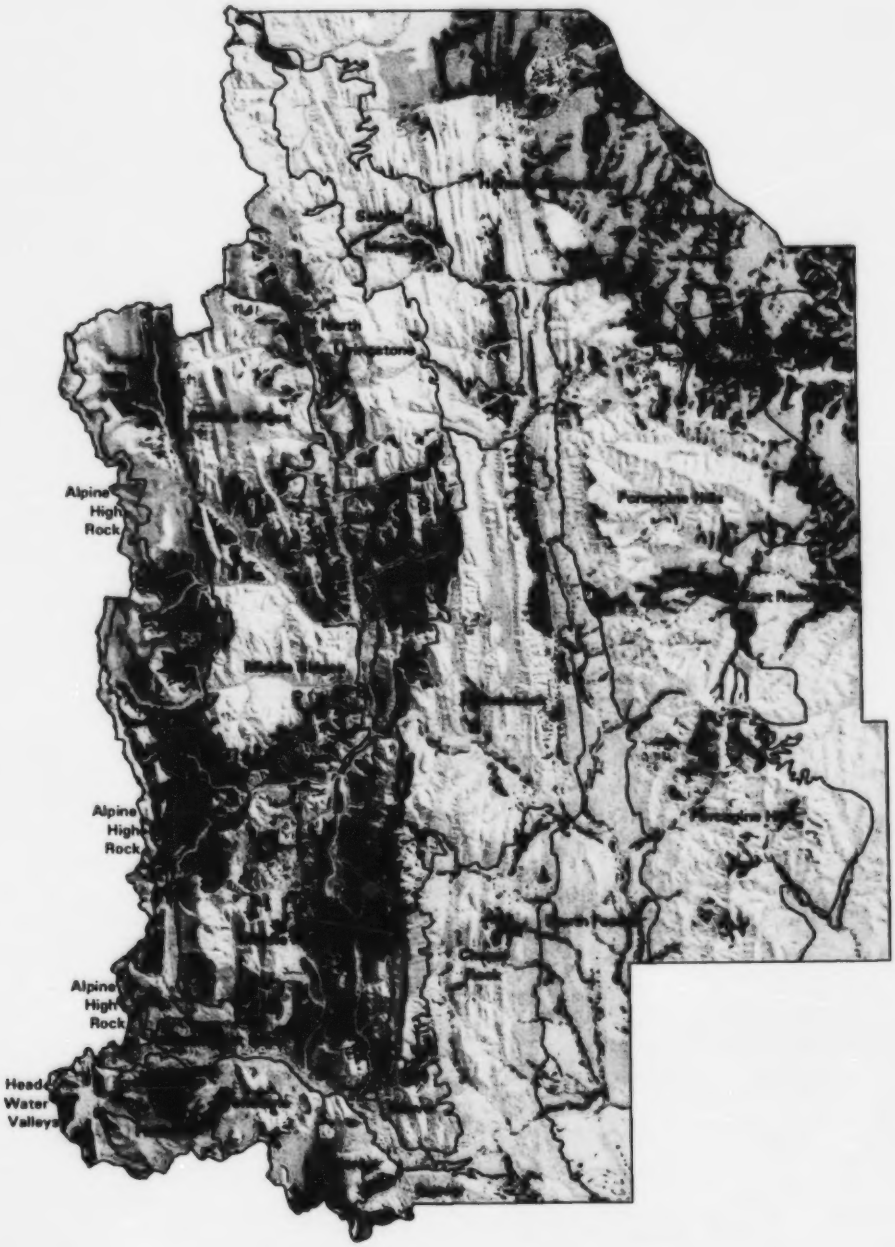
3.3 Visual Resource Value

The Visual Resource Value of the scenic resources in the study area is a combination of the Existing Visual Preference ratings for landscape types and their level of visibility. The higher the preference and visibility, the greater the visual resource value.

Visual resource value ratings were determined by assigning the following values to the unique combinations of the categories in the Visibility and the Preference Value maps. Value ratings were grouped into four visual resource value classes based upon a matrix that established class categories for the various visibility/preference value combinations. The final map displays five visual resource value classes with 1 representing the lowest and 5, the highest visual resource value.

Table 1. Value Class Matrix

		PREFERENCE VALUE CLASSES			
		Class 1	Class 2	Class 3	Class 4
	Class 1	1	2	3	4
	Class 2	1	2	3	4
VISIBILITY	Class 3	2	3	3	4
CLASSES	Class 4	2	3	4	5
	Class 5	2	3	4	5



Legend

	Area(ha)
Lowest Visual Value	2,531
Lower Visual Value	69,621
Moderate Visual Value	218,592
Higher Visual Value	175,581
Highest Visual Value	39,380

FINAL VISUAL VALUE

Southern Rockies
Landscape Planning Pilot Study

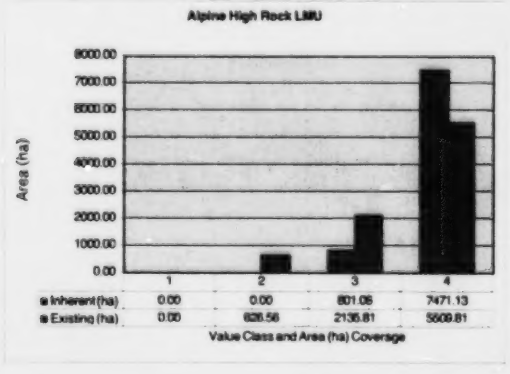
3.4 Landscape Management Unit Comparisons

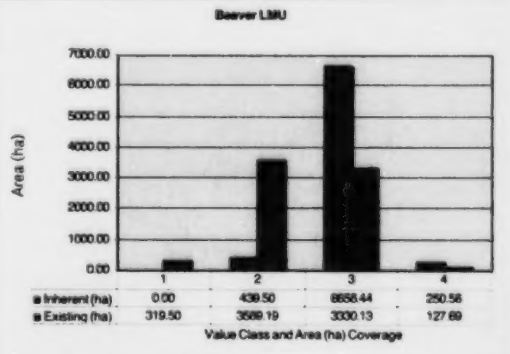
The study area is divided into 18 Landscape Management Units (LMU) which represent areas with similar ecosystems and/or land uses (refer to Disturbance and Pattern Analysis Report, 1997). LMUs have been established to create zones that would respond uniformly to management decisions and intervention practices. Guidance for the development of visual resource objectives by LMU may be established through the identification of inherent visual preference ratings, existing visual preference ratings, and final visual resource values. A summary discussion of the relationship between individual LMUs and visual resource data is provided below.

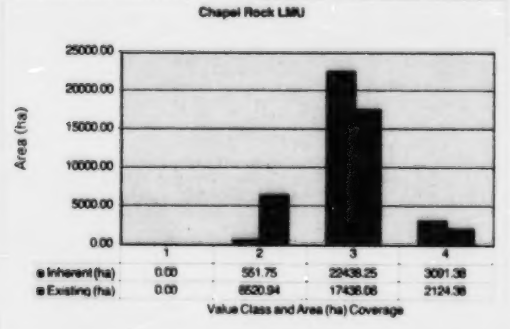
Inherent landscape preference ratings were compared to existing landscape preference ratings for each of the Landscape Management Units within the study area (refer to Figure 5). The distribution of preference class area coverage was calculated and graphed to display coverage ratios and influences of human interventions. Decreases in preference ratings due to human interventions are more prominent in the Beaver, Crowsnest, Headwater Valleys, Livingstone Valley, Middle Ridges, Saddle Mountain and Whaleback LMUs. The Headwater Valleys LMU lost 15,208 hectares of the highest visual preference landscapes (preference Class 4). Within this LMU, much of the preference rating reduction is due to timber harvest, whereas the preference reduction in the Horseshoe Parkland LMU is due primarily to the overhead transmission line.

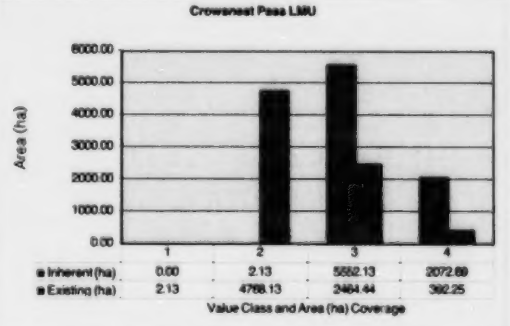
Figure 5. Visual Preference Rating Distribution by LMU – Inherent vs Existing

(1 = Low Preference Rating; 4 = High Preference Rating)

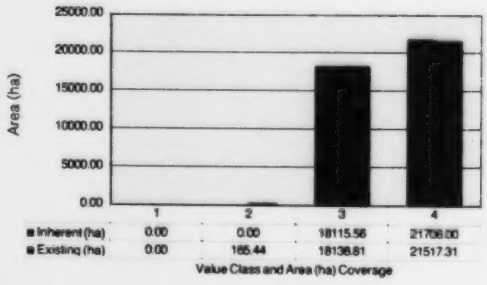








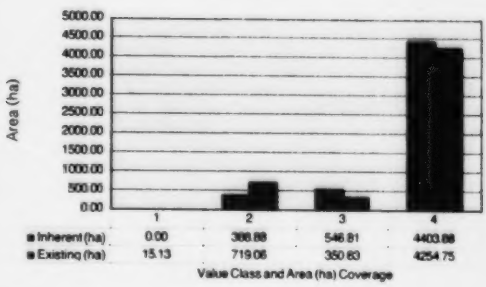
East Ranchlands LMU



	1	2	3	4
Inherent (ha)	0.00	0.00	18115.56	21706.00
Existing (ha)	0.00	185.44	18138.81	21517.31

Value Class and Area (ha) Coverage

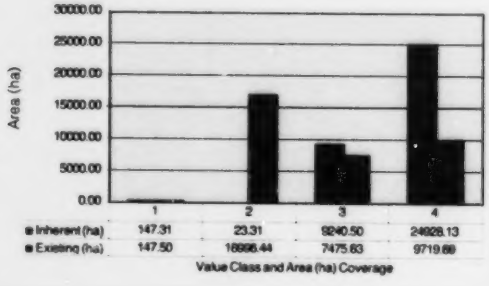
Flathead LMU



	1	2	3	4
Inherent (ha)	0.00	388.88	546.81	4403.88
Existing (ha)	15.13	719.06	350.63	4254.75

Value Class and Area (ha) Coverage

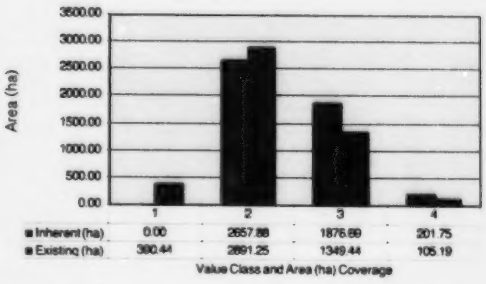
Head Water Valleys LMU



	1	2	3	4
Inherent (ha)	147.31	23.31	9240.50	24928.13
Existing (ha)	147.50	16996.44	7475.63	9719.69

Value Class and Area (ha) Coverage

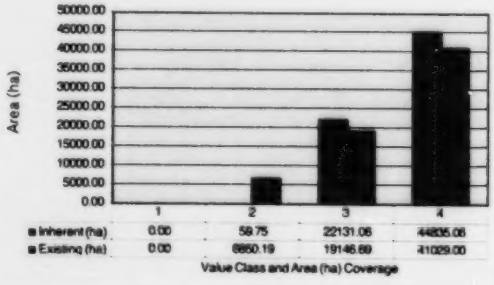
Hillcrest LMU



	1	2	3	4
Inherent (ha)	0.00	2657.88	1876.69	201.75
Existing (ha)	380.44	2891.25	1349.44	105.19

Value Class and Area (ha) Coverage

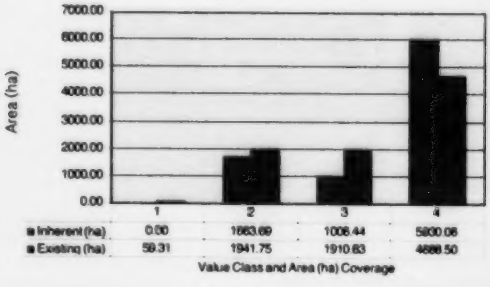
Horseshoe Parkland LMU



	1	2	3	4
Inherent (ha)	0.00	58.75	22131.06	44805.06
Existing (ha)	0.00	8650.19	19146.69	41029.00

Value Class and Area (ha) Coverage

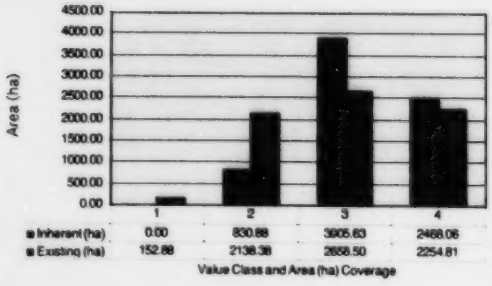
Ironstone LMU



	1	2	3	4
Inherent (ha)	0.00	1663.69	1008.44	5800.06
Existing (ha)	58.31	1941.75	1910.63	4688.50

Value Class and Area (ha) Coverage

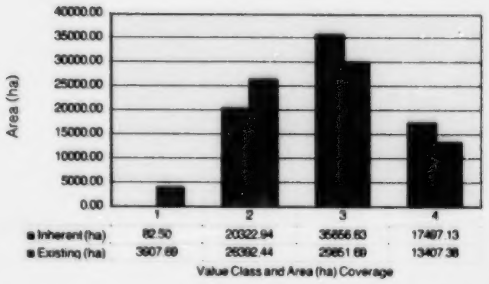
Livingstone Valley LMU



	1	2	3	4
Inherent (ha)	0.00	830.88	3905.63	2468.06
Existing (ha)	152.88	2138.38	2658.50	2254.81

Value Class and Area (ha) Coverage

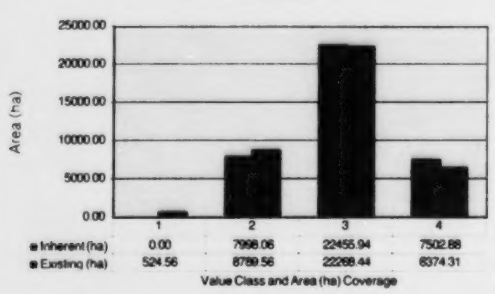
Middle Ridges LMU



	1	2	3	4
Inherent (ha)	82.50	20322.94	35656.63	17487.13
Existing (ha)	3607.69	26392.44	29651.69	13407.38

Value Class and Area (ha) Coverage

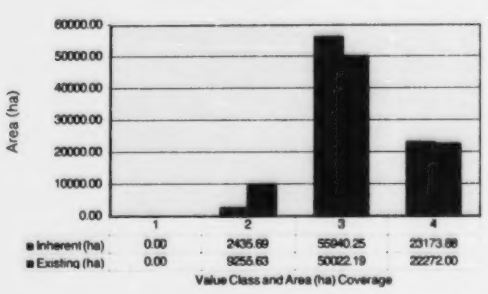
North Livingstone LMU



	1	2	3	4
Inherent (ha)	0.00	7998.06	22455.94	7502.88
Existing (ha)	524.56	8789.56	22268.44	6374.31

Value Class and Area (ha) Coverage

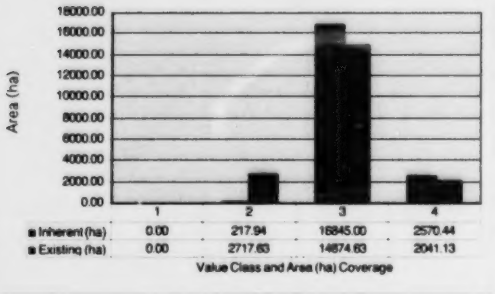
Porcupine Hills LMU



	1	2	3	4
Inherent (ha)	0.00	2435.69	55940.25	23173.88
Existing (ha)	0.00	9255.63	50022.19	22272.00

Value Class and Area (ha) Coverage

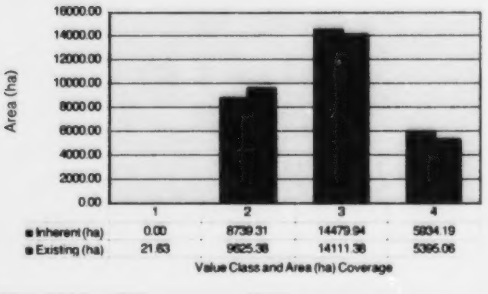
Saddle Mountain LMU



	1	2	3	4
Inherent (ha)	0.00	217.94	16845.00	2570.44
Existing (ha)	0.00	2717.63	14874.63	2041.13

Value Class and Area (ha) Coverage

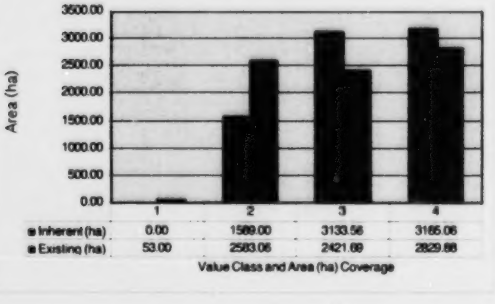
South Fescue LMU



	1	2	3	4
Inherent (ha)	0.00	8739.31	14479.94	5934.19
Existing (ha)	21.63	9625.38	14111.38	5395.06

Value Class and Area (ha) Coverage

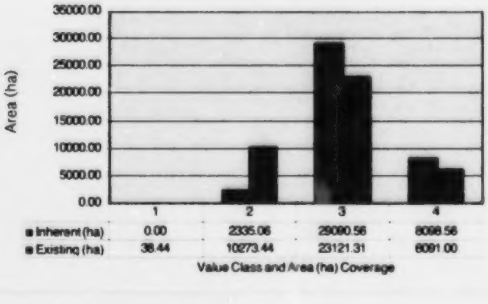
South Livingstone LMU



	1	2	3	4
Inherent (ha)	0.00	1589.00	3133.56	3165.06
Existing (ha)	53.00	2583.06	2421.69	2829.88

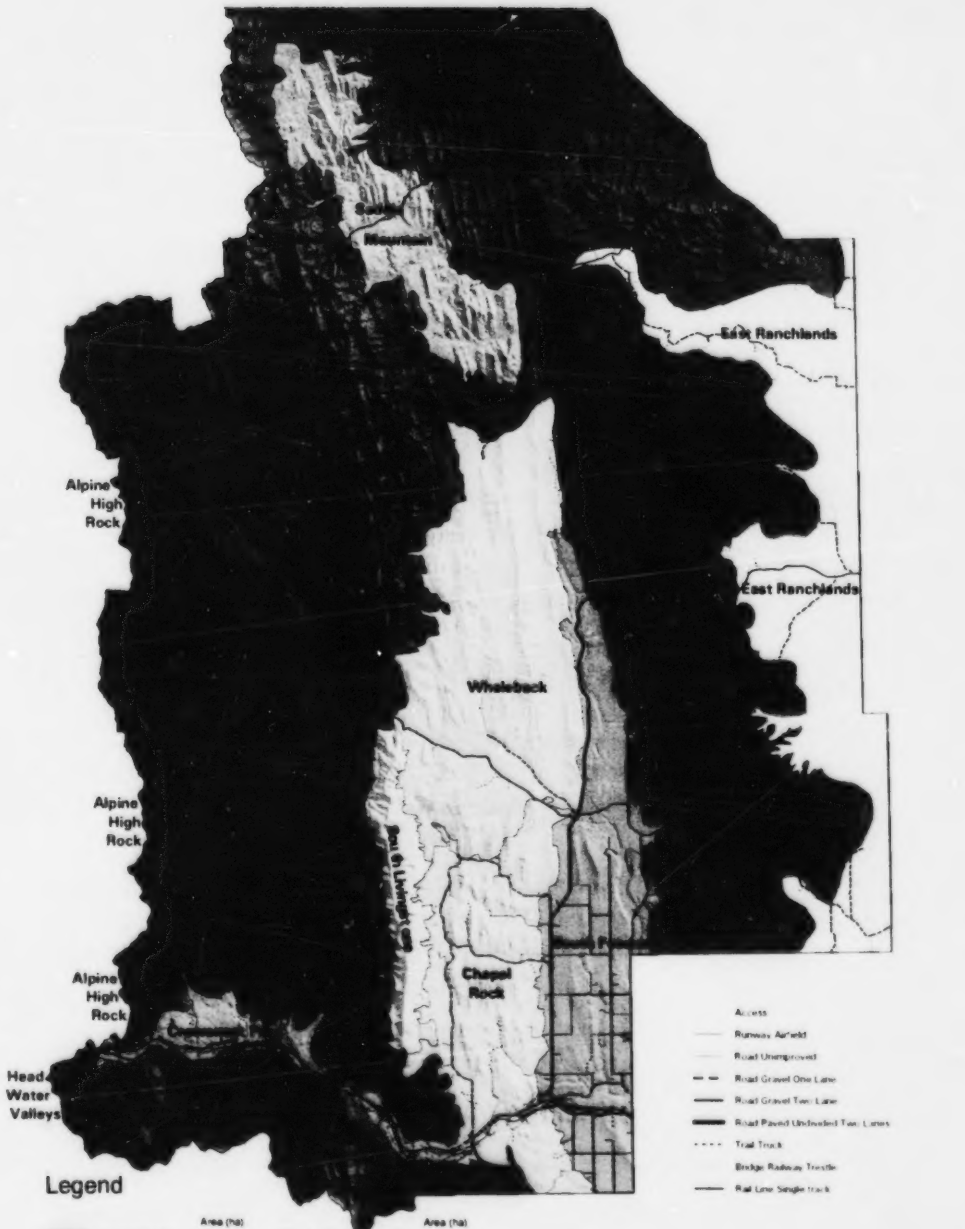
Value Class and Area (ha) Coverage

Whaleback LMU



	1	2	3	4
Inherent (ha)	0.00	2335.06	29080.56	8098.56
Existing (ha)	38.44	10273.44	23121.31	6091.00

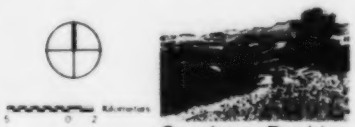
Value Class and Area (ha) Coverage



Legend

	Area (ha)		Area (ha)
Alpine High Rock	8 277	South Livingstone	7 888
Head Water Valleys	34 357	Beaver	7 356
Flathead	5 351	Horseshoe Parkland	67 036
Crowsnest Pass	7 628	Saddle Mountain	19 633
Middle Ridges	73 580	Whaleback	39 524
Ironstone	8 609	Chapel Rock	26 085
Hillcrest	4 740	South Fescue	29 170
North Livingstone	37 980	Porcupine Hills	81 580
Livingstone Valley	7 205	East Ranchlands	39 899

LANDSCAPE MANAGEMENT UNITS



Southern Rockies
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Table 2 displays the distribution of value classes among individual LMUs. In general, LMU units reflect a normal distribution in which the majority of values are within the middle range value class 3 and a proportional number of values are distributed on either side of this middle point. Alpine Rock, East Ranchlands, Flathead and Ironstone LMUs had a higher distribution of values in the 4 and 5 class range, whereas most of the area in the Head Water Valleys and Hillcrest LMUs were in the low range values.

Table 2. LMU Value Class Coverage

	VALUE CLASS				
	1	2	3	4	5
LMU	(% Cover)	(% Cover)	(% Cover)	(% Cover)	(% Cover)
Alpine High Rock	0.0	4.7	24.3	63.8	7.1
Beaver	1.3	15.5	57.3	25.4	0.6
Chapel Rock	0.0	7.7	52.1	38.0	2.2
Crowsnest Pass	0.0	28.1	58.0	13.2	0.7
East Ranchlands	0.0	0.1	31.5	45.5	22.9
Flathead	0.1	9.7	8.7	58.6	22.9
Head Water Valleys	0.4	42.0	28.3	28.0	1.2
Hillcrest	1.7	40.3	36.9	19.5	1.7
Ironstone	0.1	11.5	22.9	51.9	13.6
Livingstone Valley	0.6	12.9	42.8	36.1	7.6
Middle Ridges	2.8	28.2	47.3	19.8	2.0
North Livingstone	0.1	18.9	56.9	21.0	3.0
Parkland	0.0	5.5	30.1	47.3	17.1
Porcupine Hill	0.0	5.6	47.6	38.0	8.7
Saddle Mountain	0.0	10.1	73.2	16.0	0.7
South Fescue	0.0	2.5	41.8	48.1	7.6
South Livingstone	0.1	10.2	31.4	41.8	16.5
Whaleback	0.1	13.7	51.5	32.7	2.0

4.0 IMPLICATIONS FOR MANAGEMENT

The results of this study indicate that the area is both highly valued as a visual resource and sensitive to human intervention. The study area represents a rare and unique visual resource opportunity which is often not found or has been lost to many sites in such close proximity to a major urban center.

4.1 Summary of Findings

- The visual landscape is highly preferred throughout the study area.
- The five photographs with the lowest preference ratings represented rectilinear cutting, brush piles and mining.
- Management activities and human interventions significantly affect visual preference ratings.
- Increased visibility influences the perceived effect of interventions.
- Curvilinear cut patterns are more preferred than rectilinear patterns.
- High mountain ranges, forested slopes and waterbodies have the highest visual preference ratings.
- The influence of overhead transmission lines on visual preference is significant and covers a large area.
- The influence of gas wells on visual preference increases with closer proximity to travel corridors.
- Rural residential (ranch homesteads) that are widely dispersed have little impact on visual preference.
- High recreational use will likely lead to additional trails and therefore, open up the visibility of the area.

4.2 Recommendations

- All areas with the study area should be considered as sensitive to human intervention and should be managed to conserve the visual resource.
- Photographic representation or highly detailed computer renderings of proposed interventions in highly visible areas should be used for public consultation.
- As new roads are developed and the visibility of areas increases, the Visual Resource Value map should be recalculated and mitigation requirements reconsidered.
- Buffer management from roads should only be considered appropriate in areas of relatively flat terrain. It should not be the exclusive mitigation method due to potential visibility from elevated viewing sites.

- Opportunity exists for the improvement of visual quality with timber harvest practices by utilizing more curvilinear patterns and retaining residual islands of varying sizes within the cutblocks.

- Retention periods as long as 60 years should be considered for areas subject to second pass harvesting.

- Remedial cutting should be carried out in areas where alternate patch clearcutting has been highly rectilinear.

- Woody debris brush piles should be distributed in a less regular manner, both in size and placement.

- Extra care and attention should be given to those areas of high visibility and long duration views.

- The area and extent of visual influence of overhead transmission lines is great. Location and extent of coverage should be considered before the addition of more lines.

- Overhead transmission lines, roads, pipe lines, etc. should not cross ridge lines on axis with major view lines.

- Future studies should include a more detailed analysis of visual preference towards wildfire, high density residential development and grazing. In addition, the distance from view points of interventions and the subsequent influence on visual resource value requires further study.

- Designate Highway 40, Highway 22, the Skyline Trail and Highway 3 as scenic byways. Other roads, including the Allison Creek Atlas haul road, the Dutch Creek road and the Upper Old Man road, should be considered for future designation.

- In addition to foresters, design professionals should be consulted for cutblock layout and planning.

- In those LMUs that have suffered the greatest loss in visual preference rating due to human interventions, conservation and enhancement of the visual resource should be aggressively pursued.

- On areas that have not been heavily impacted, management should pursue maintenance of the existing preference class ratings.

- Managers should consider the existing visual preference ratings for areas which currently do not have roads when establishing visual resource management objectives.

- Future visual resource modelling should consider visibility from designated backcountry trails (currently no trails are officially designated).

4.3 Summary of Terms

Existing Visual Preference Ratings – the outcome of inherent preference ratings influenced by a human intervention coefficient.

Human Intervention – includes timber harvest, gas wells, transmission lines and designated camping sites.

Inherent Visual Preference Ratings – public preference ratings for the various land systems prior to the influence of human interventions.

Landscape Management Unit (LMU) – represents areas with similar ecosystems and/or land uses.

Land System – land area identified in the Ecological Land Classification data for the Livingstone–Porcupine Hills regions which represent recurring patterns of slope, landform, soils and vegetation.

Preference Ratings – numerical ratings (1–5) assigned to photographic representations based upon level of public preference.

Visual Resource Value – the product of public preference ratings for landscape types (land systems) and the degree of visual exposure (visibility) from transportation corridors.

Visibility – is defined in terms of whether areas are visible from transportation corridors (ranging from truck trails to major paved roads) in the study area.

Visibility Rating – is assigned based upon the number of times a location can be seen from various vertices on the road network.

5.0 REFERENCES

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